

FIG. 1. MEMBRANE DESICCATION HEAT PUMP
GENERAL CONCEPT

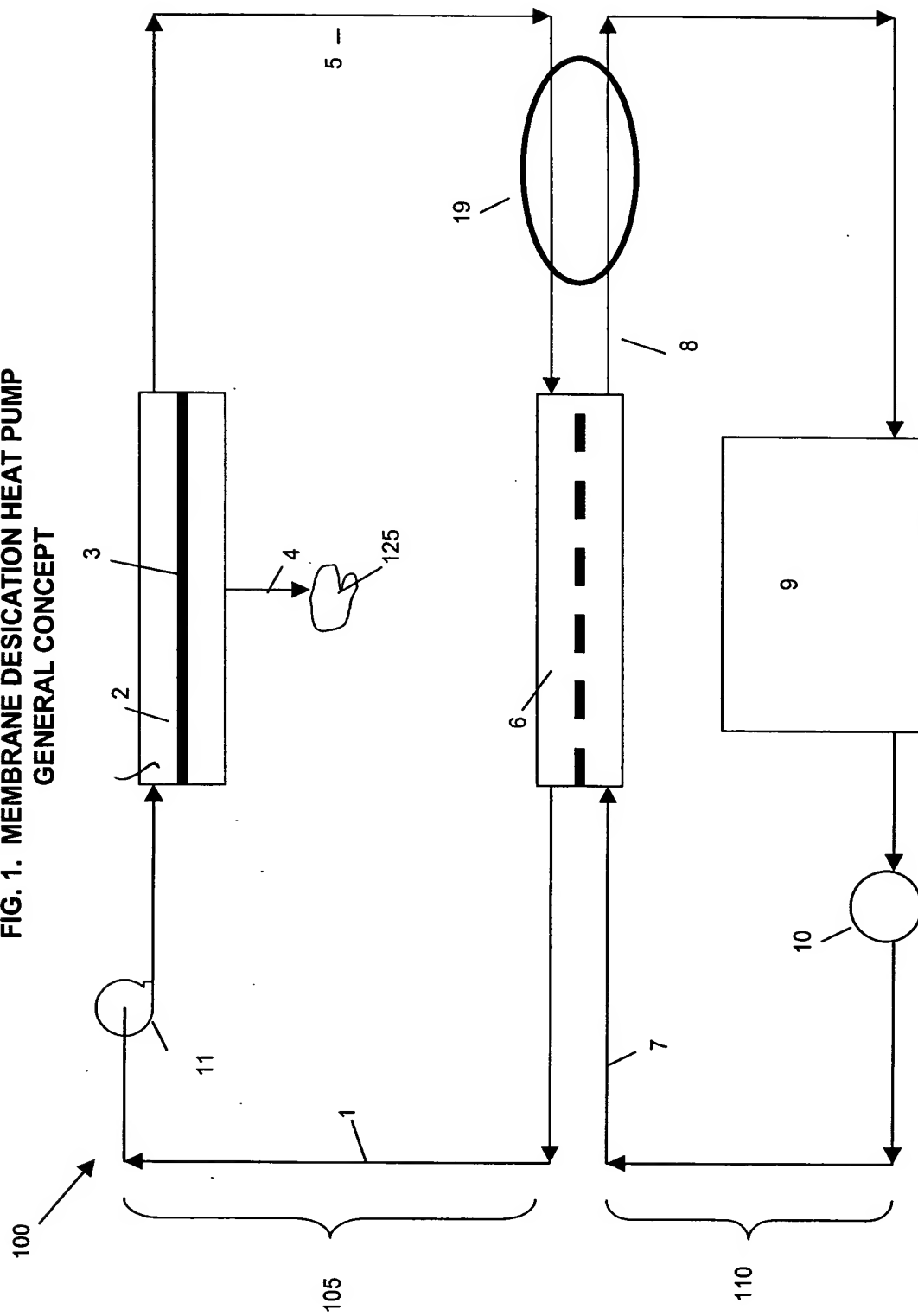


FIG. 2A. MIXED PERMEATE FLOW

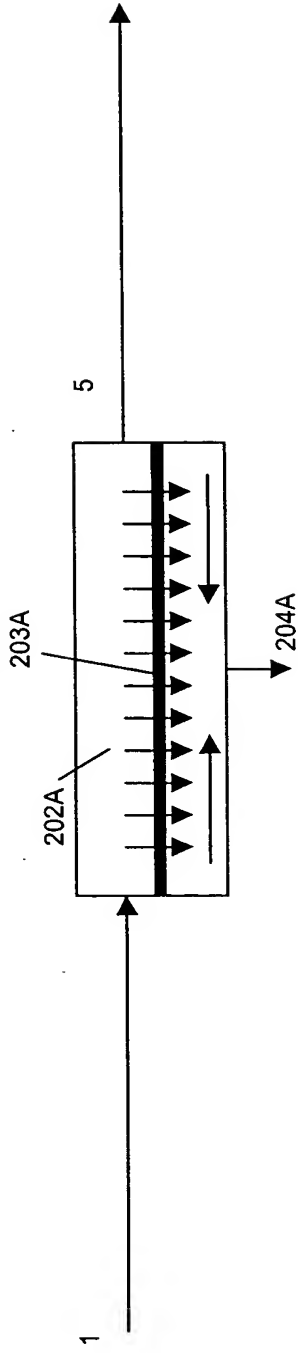


FIG. 2B. COCURRENT PERMEATE FLOW

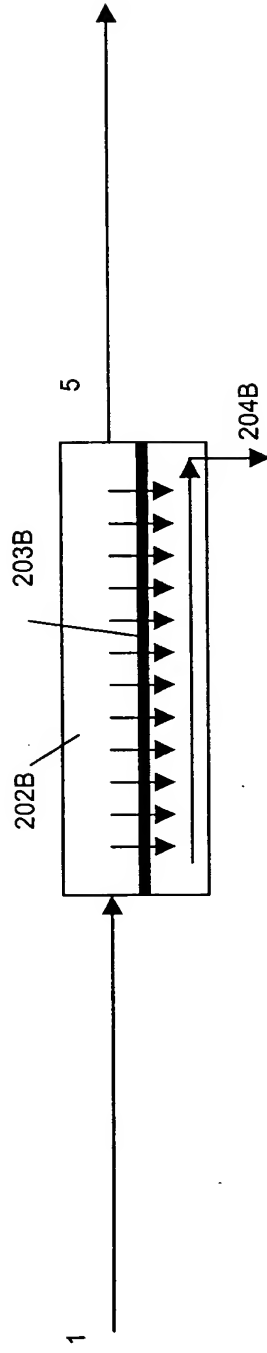
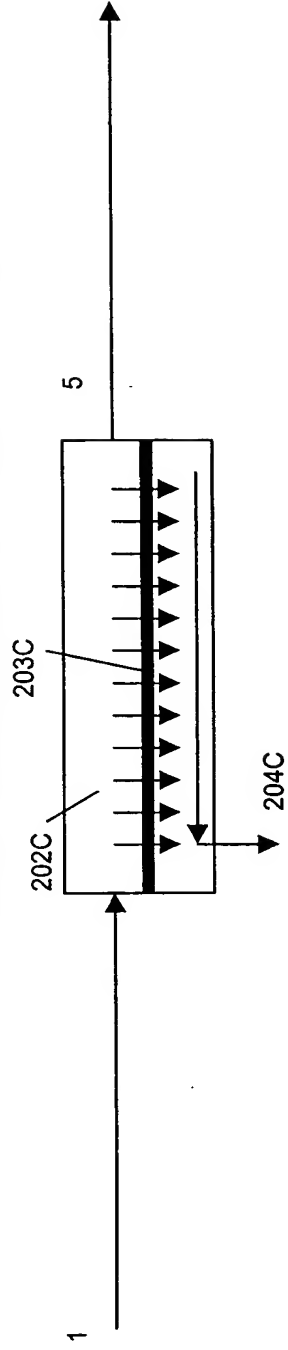


FIG. 2C. COUNTERCURRENT PERMEATE FLOW



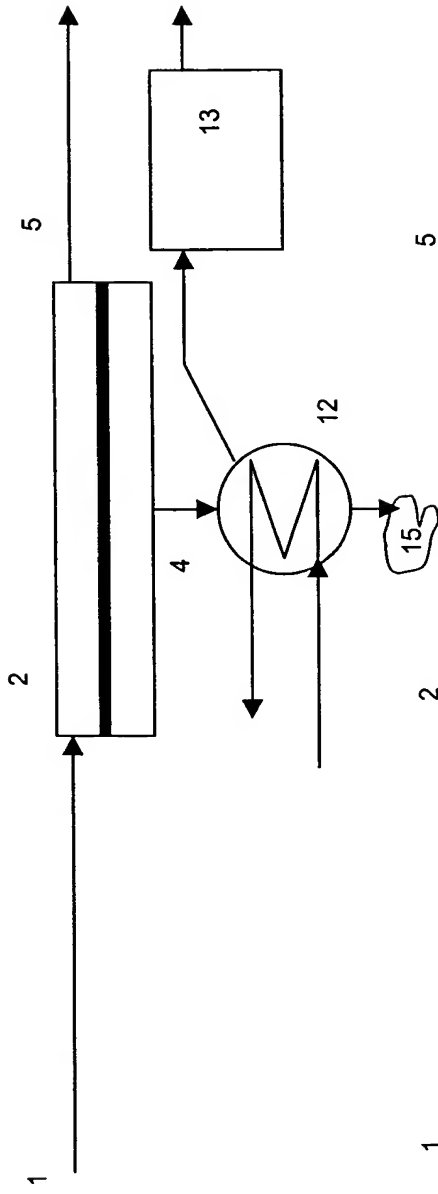


FIG. 3A
VACUUM

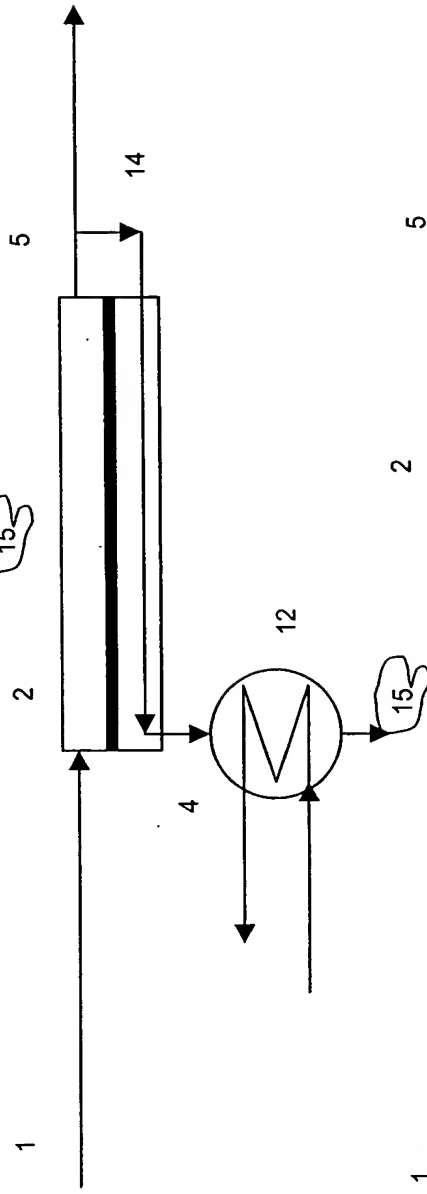


FIG. 3B
REFLUX

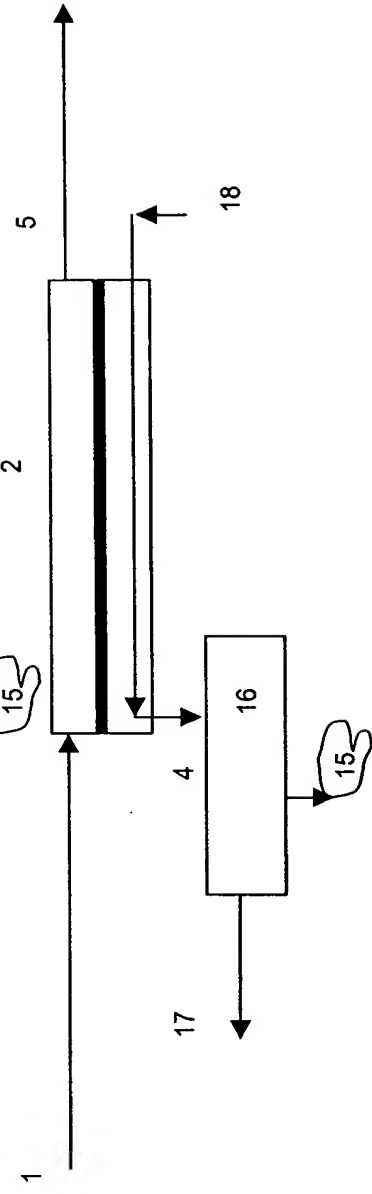


FIG. 3C
SWEEPING

FIG. 4. HEAT PUMP - OPEN CYCLES

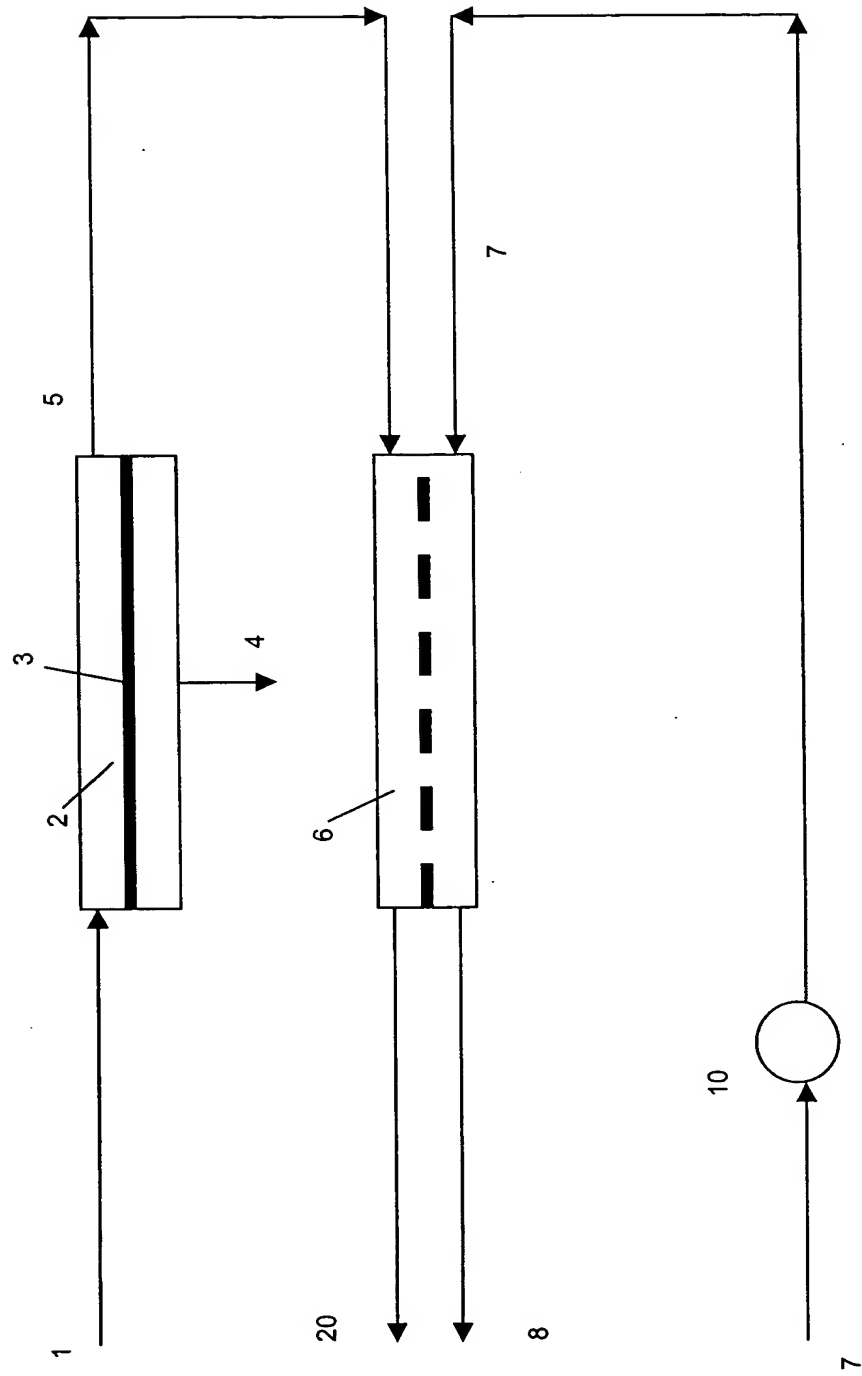


FIG. 5. OPEN CYCLE GAS CHILLING / AIR CONDITIONING

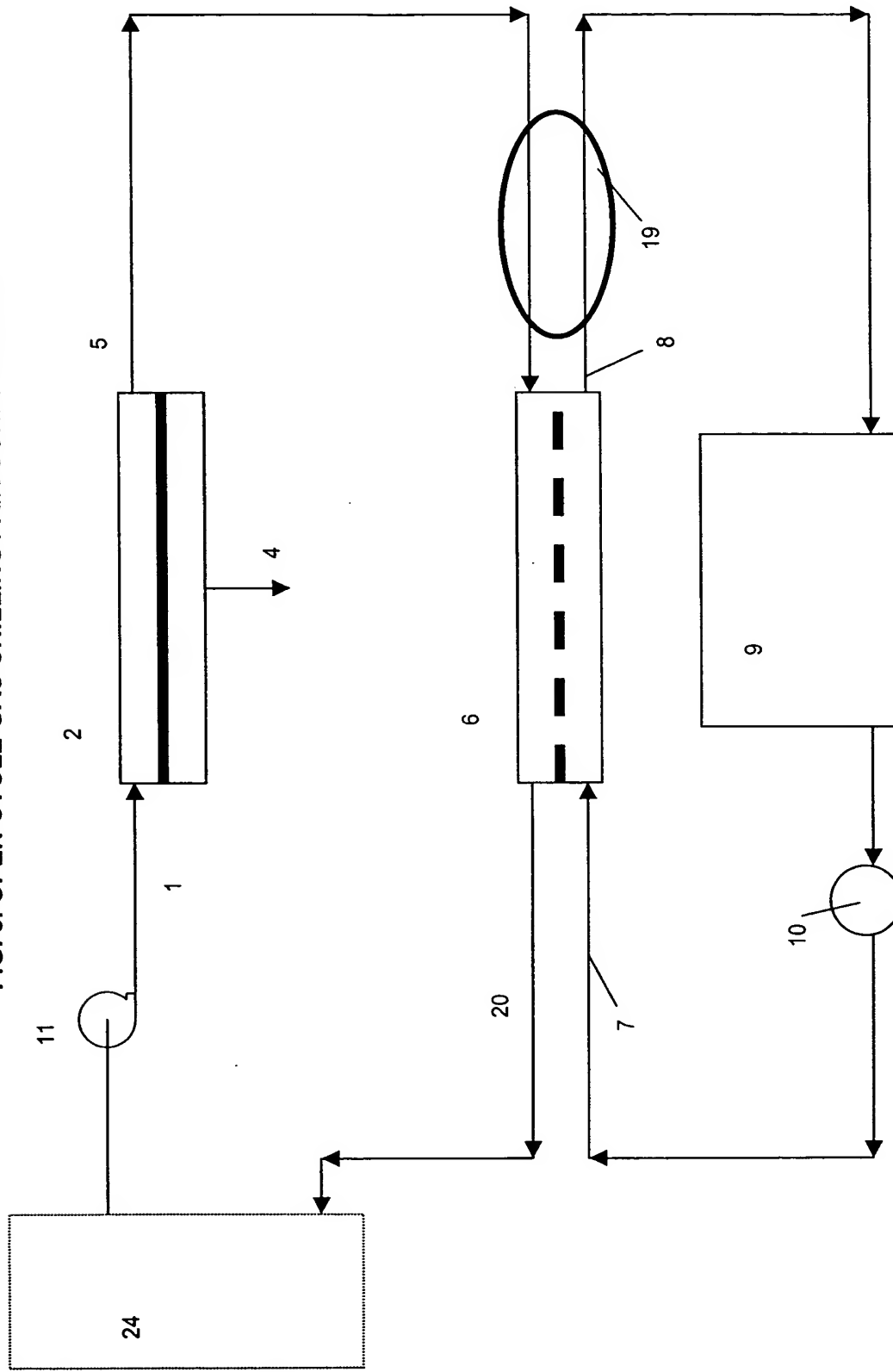


FIG. 6. LIQUID CHILLING - OPEN CYCLE

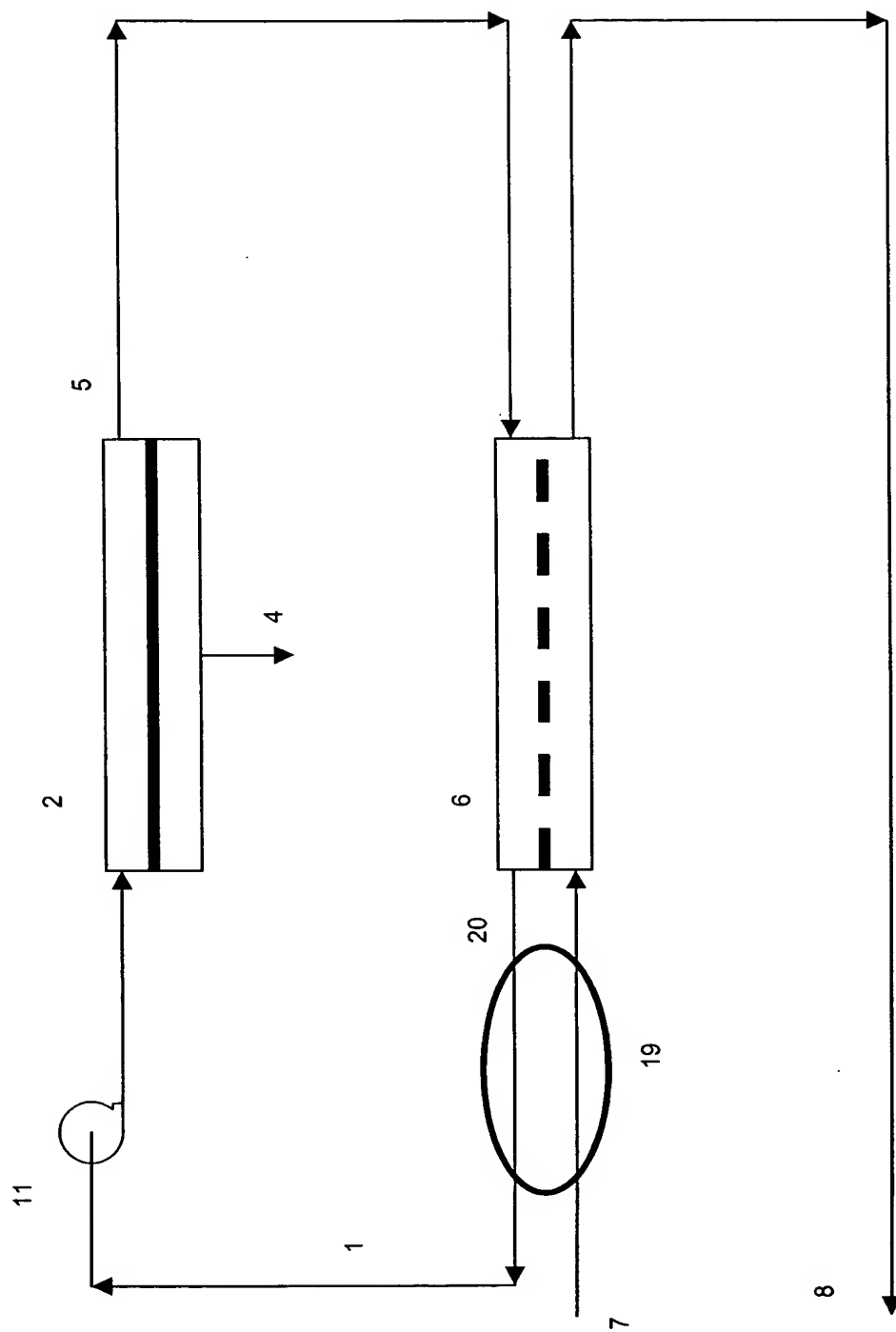


FIG. 7. GAS CHILLING - CLOSED CYCLE

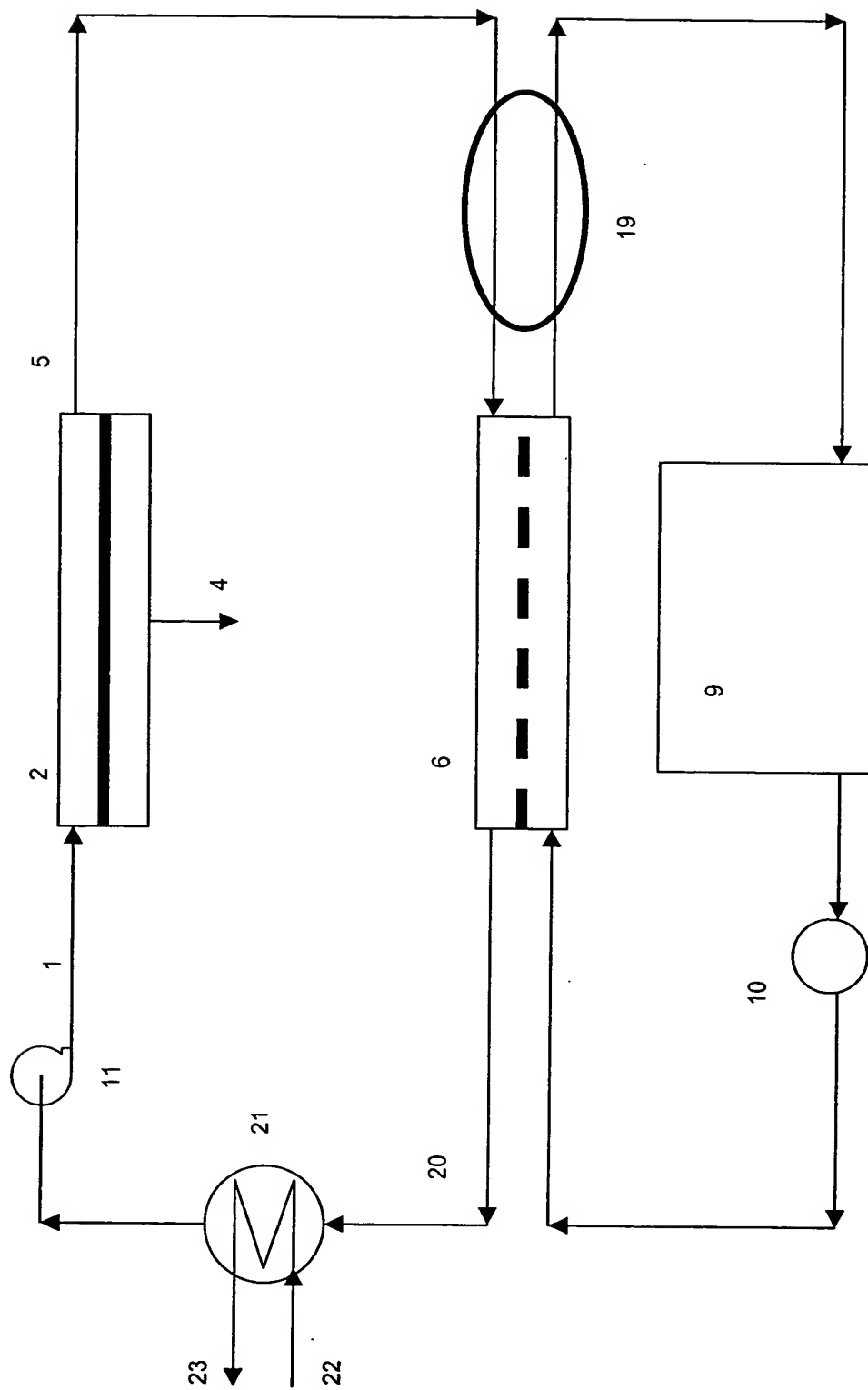


FIG. 8. CLOSED CYCLE LIQUID CHILLING

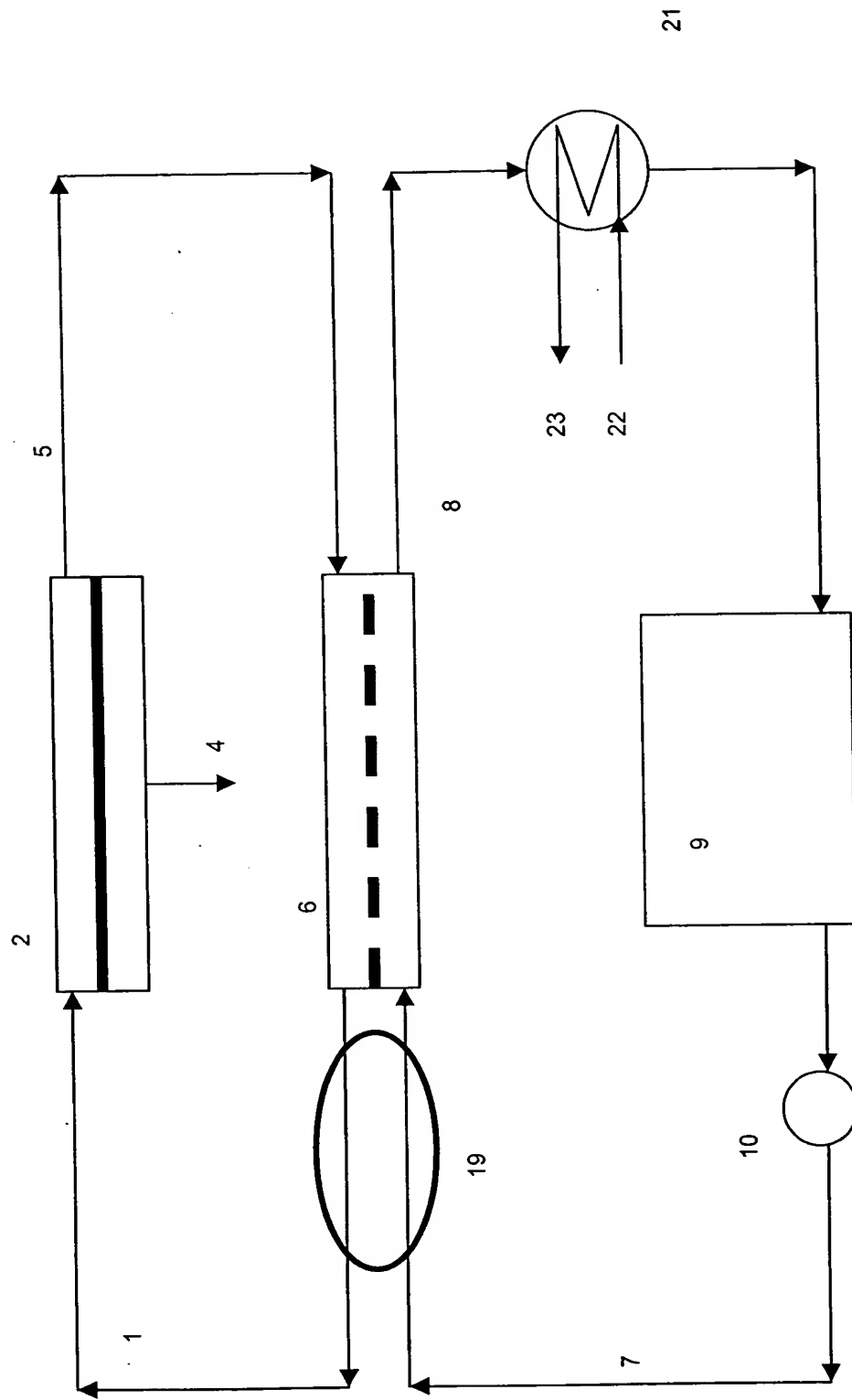


FIG. 9. GAS CHILLING/AIR CONDITIONING + VAPOR CONTENT CONTROL

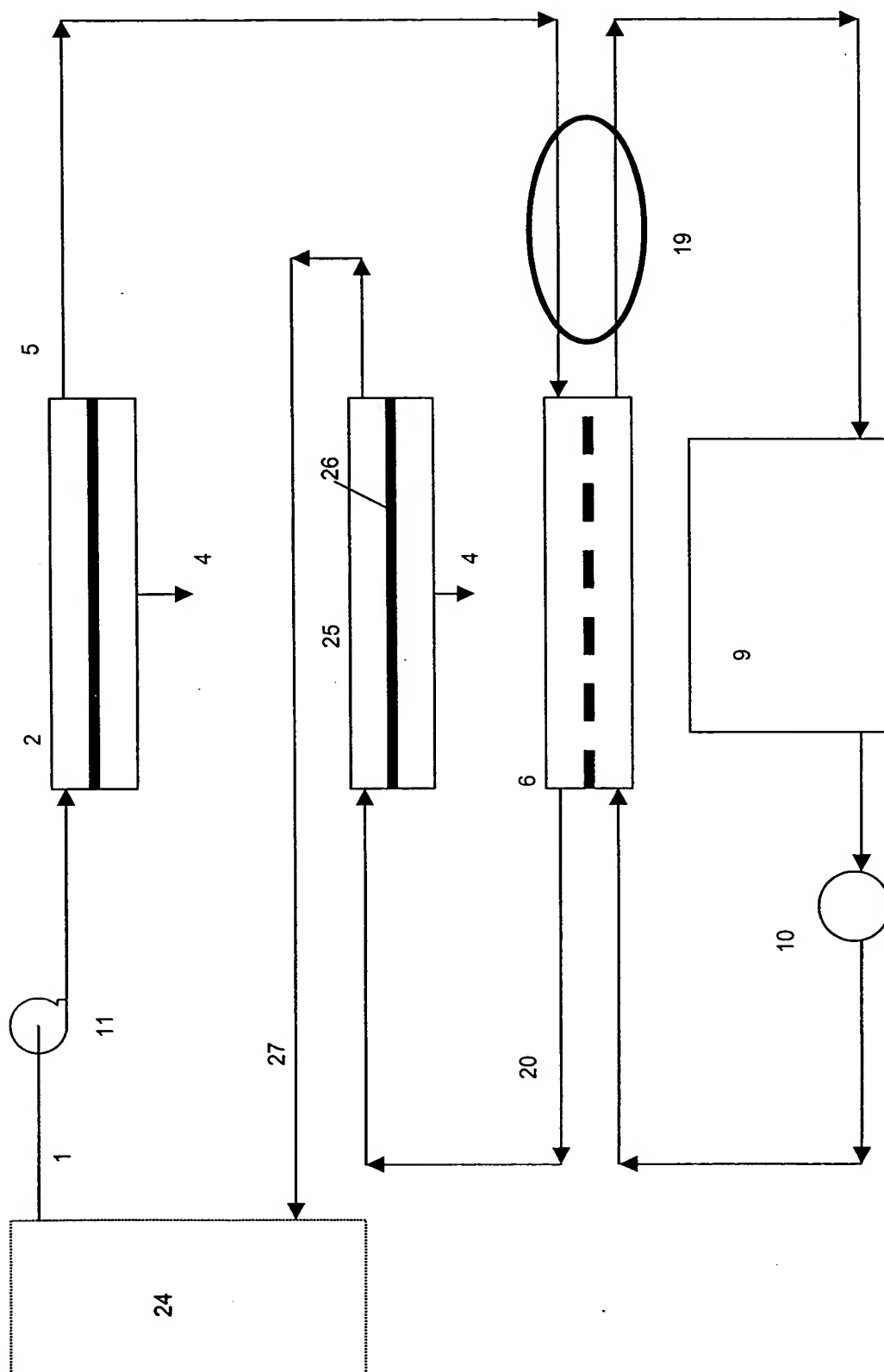


FIG. 10. LIQUID CHILLING - OPEN CYCLE Q IN

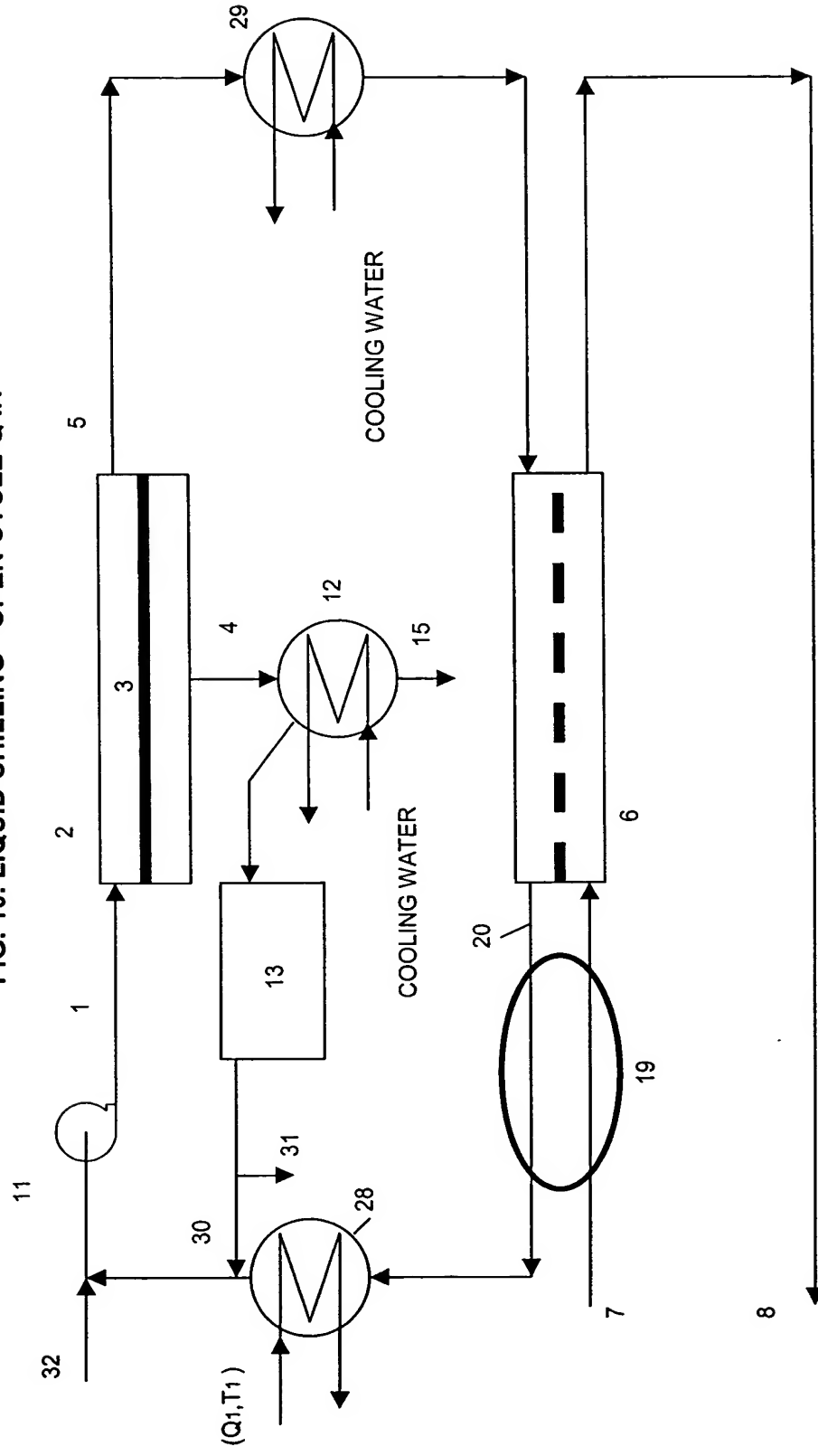


FIG. 11. LIQUID CHILLING - OPEN CYCLE + REFLUX

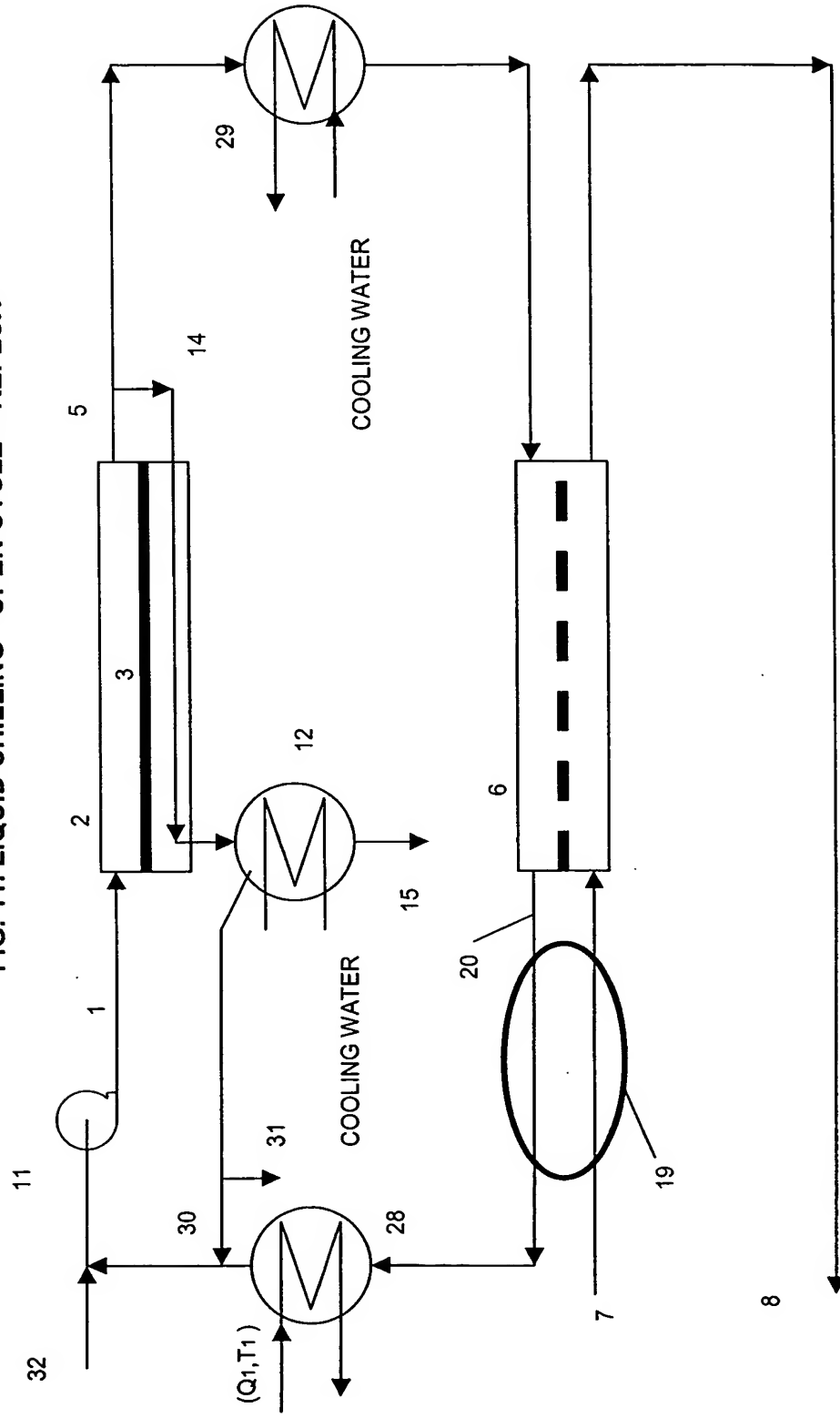


FIG. 12. AIR CONDITIONING - DETAILED

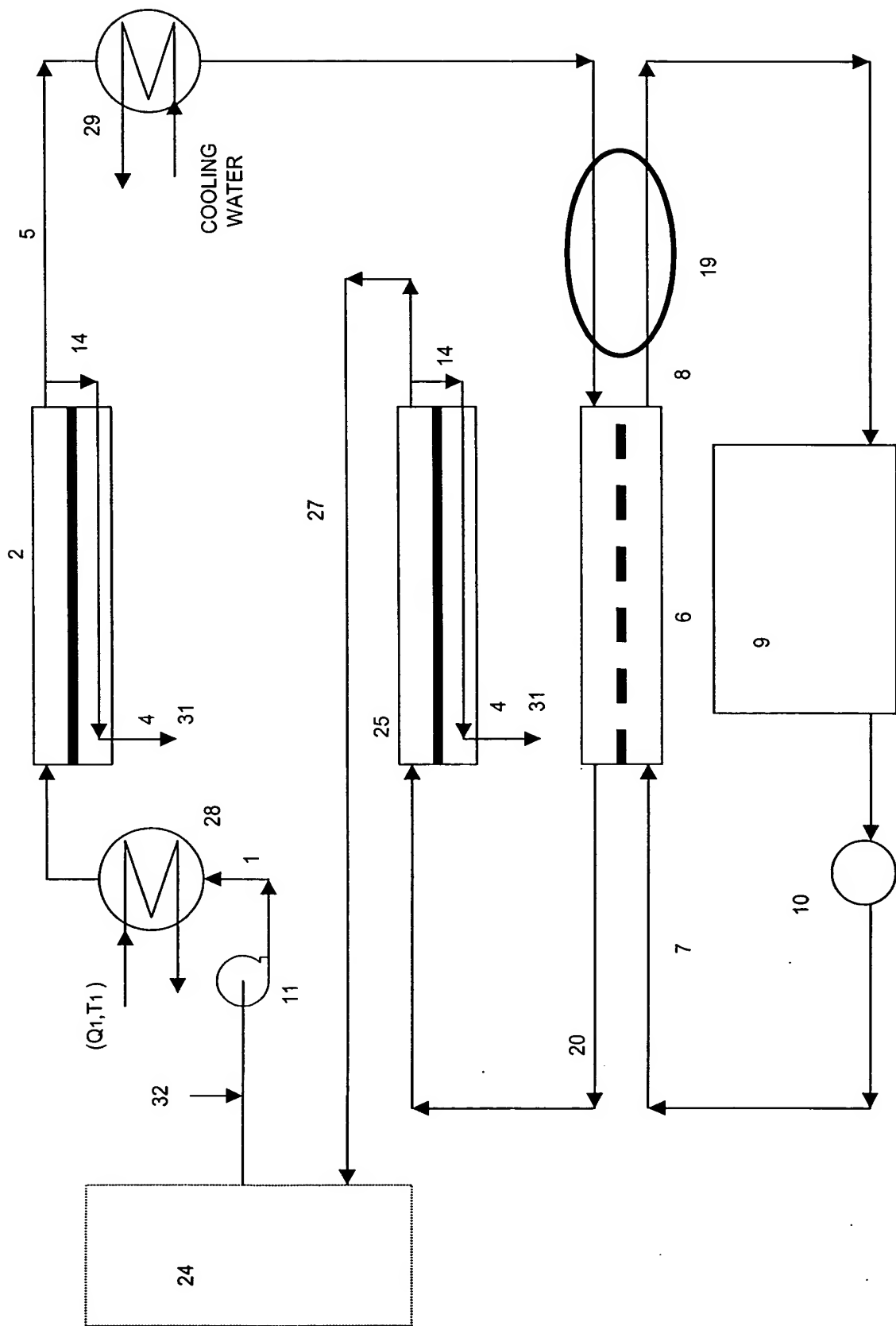


FIG. 13. MEMBRANE HEAT PUMP
HEATING MODE

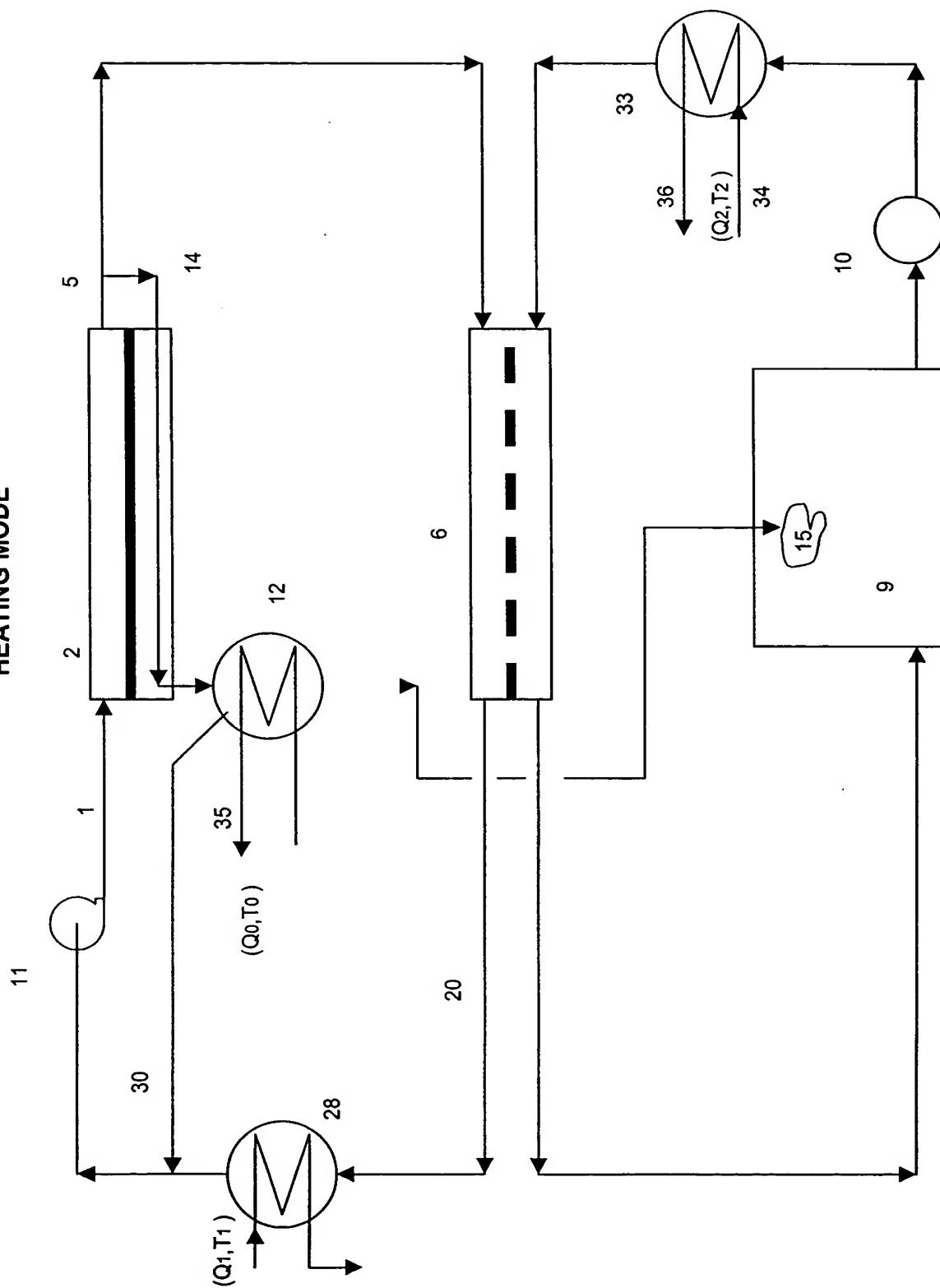


FIG. 14. MEMBRANE HEAT PUMP
HEATING MODE

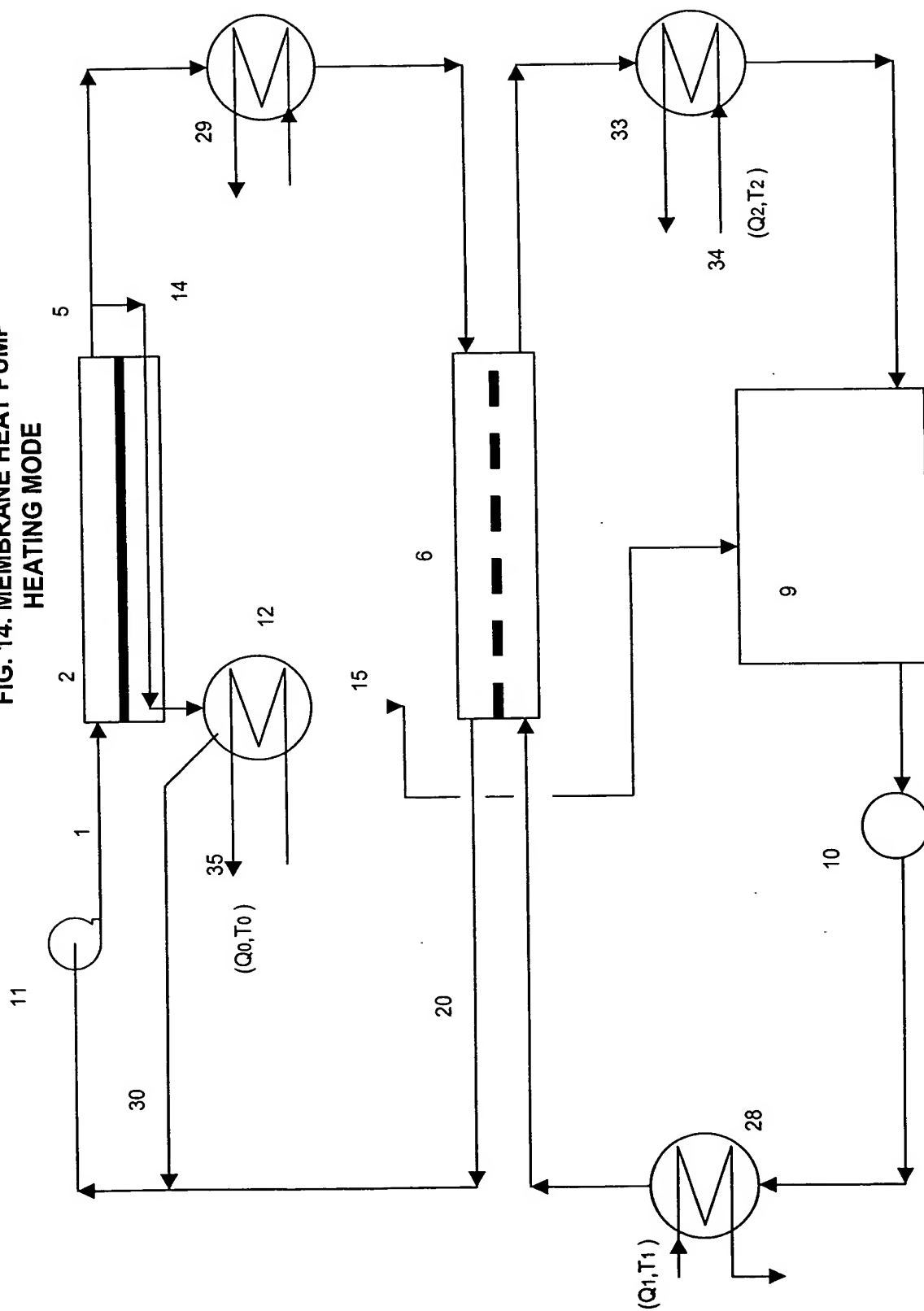


FIG. 15. MEMBRANE HEAT PUMP
RECOVERING HEAT FROM A COOLING TOWER

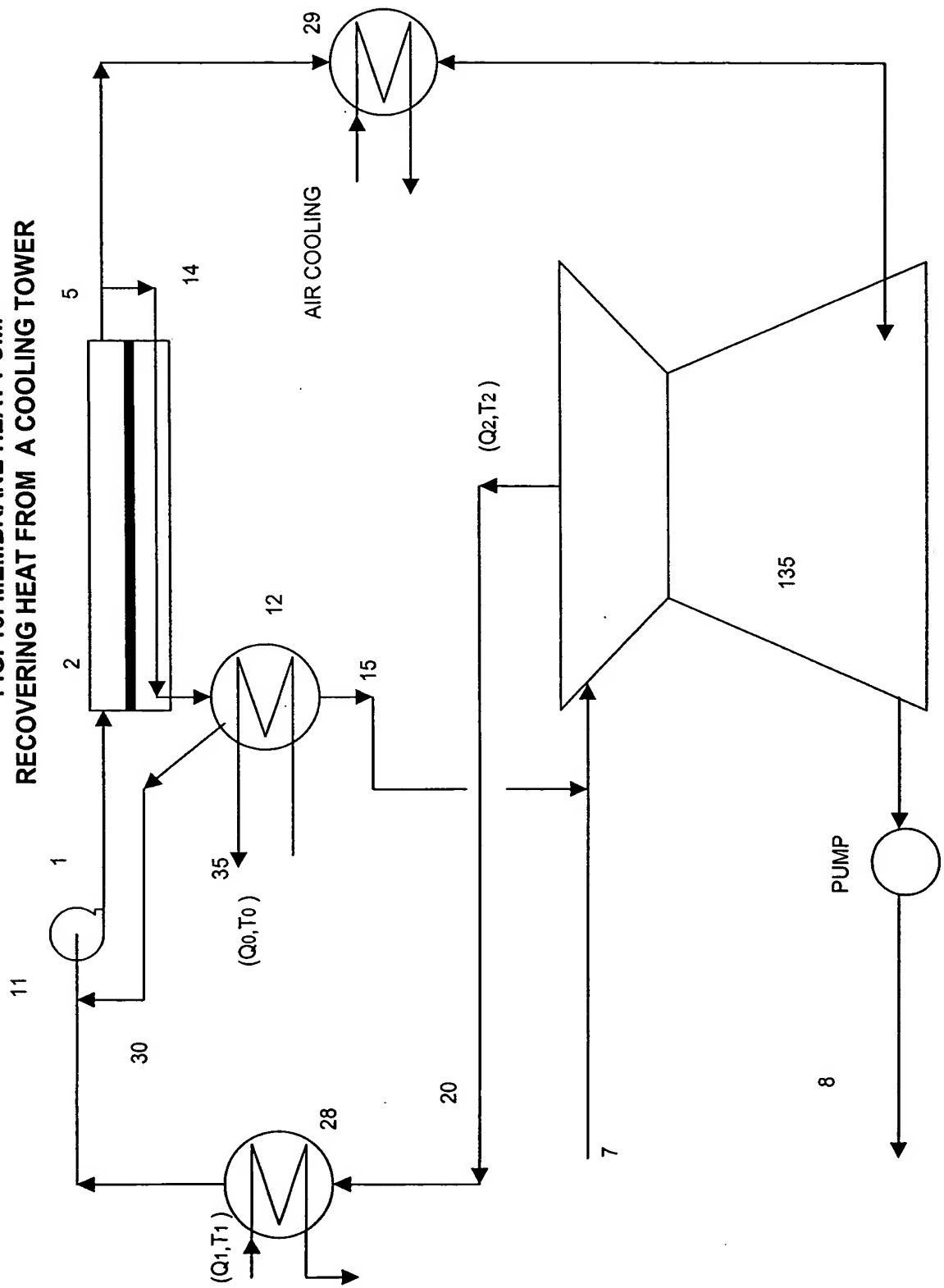


FIG. 16. MEMBRANE HEAT PUMP
RECOVERING HEAT FROM A COOLING TOWER

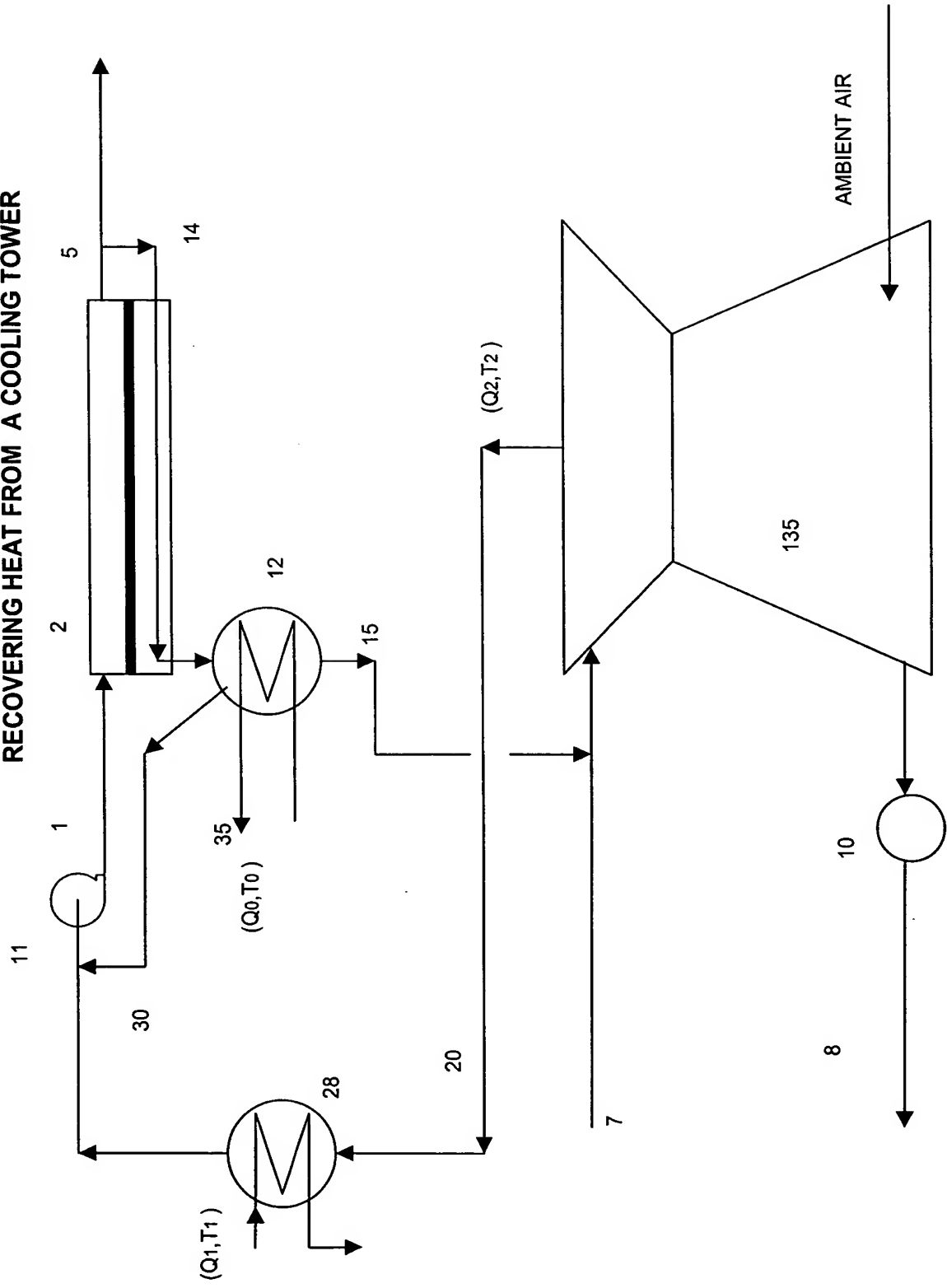


FIG. 17. HEAT PUMP PERFORMANCE
 t_2 HEAT TAKING TEMPERATURE = 40 DEG C

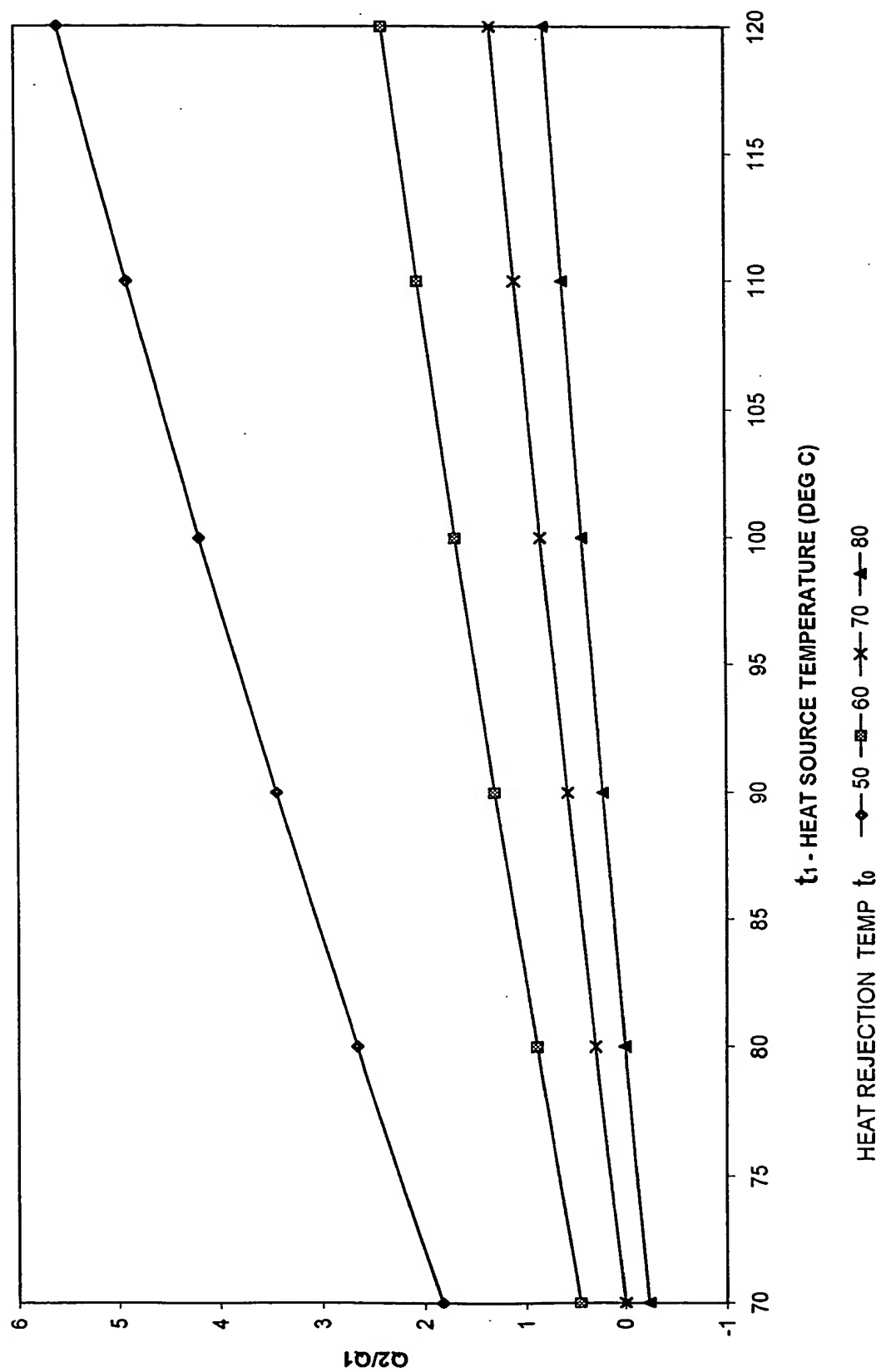


FIG. 18. HEAT PUMP PERFORMANCE
 t_1 HEAT SOURCE TEMPERATURE = 120 DEG C

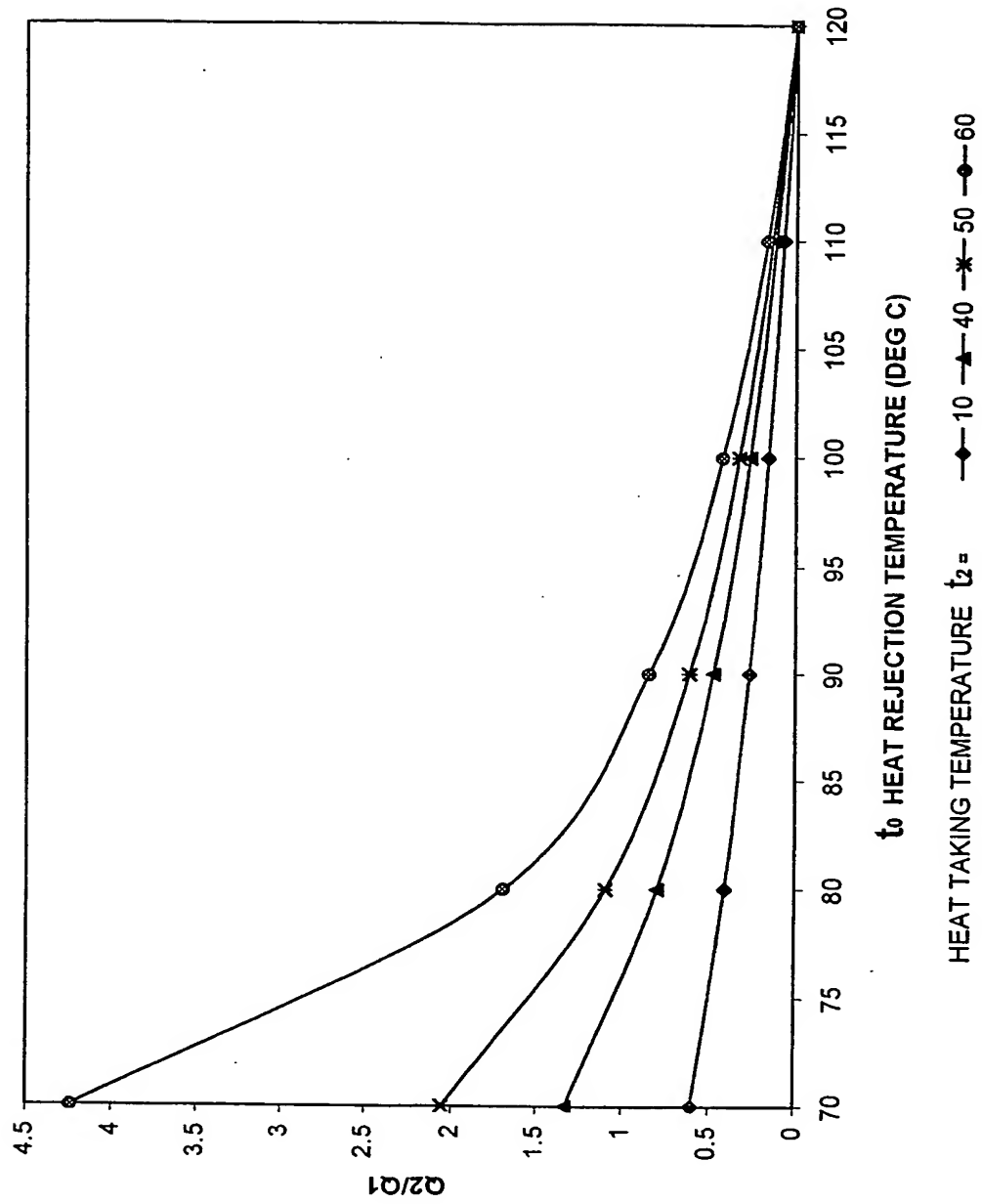


FIG. 19. MEMBRANE HEAT PUMP PROCESS
SHOWN ON A PSYCHOMETRIC CHART

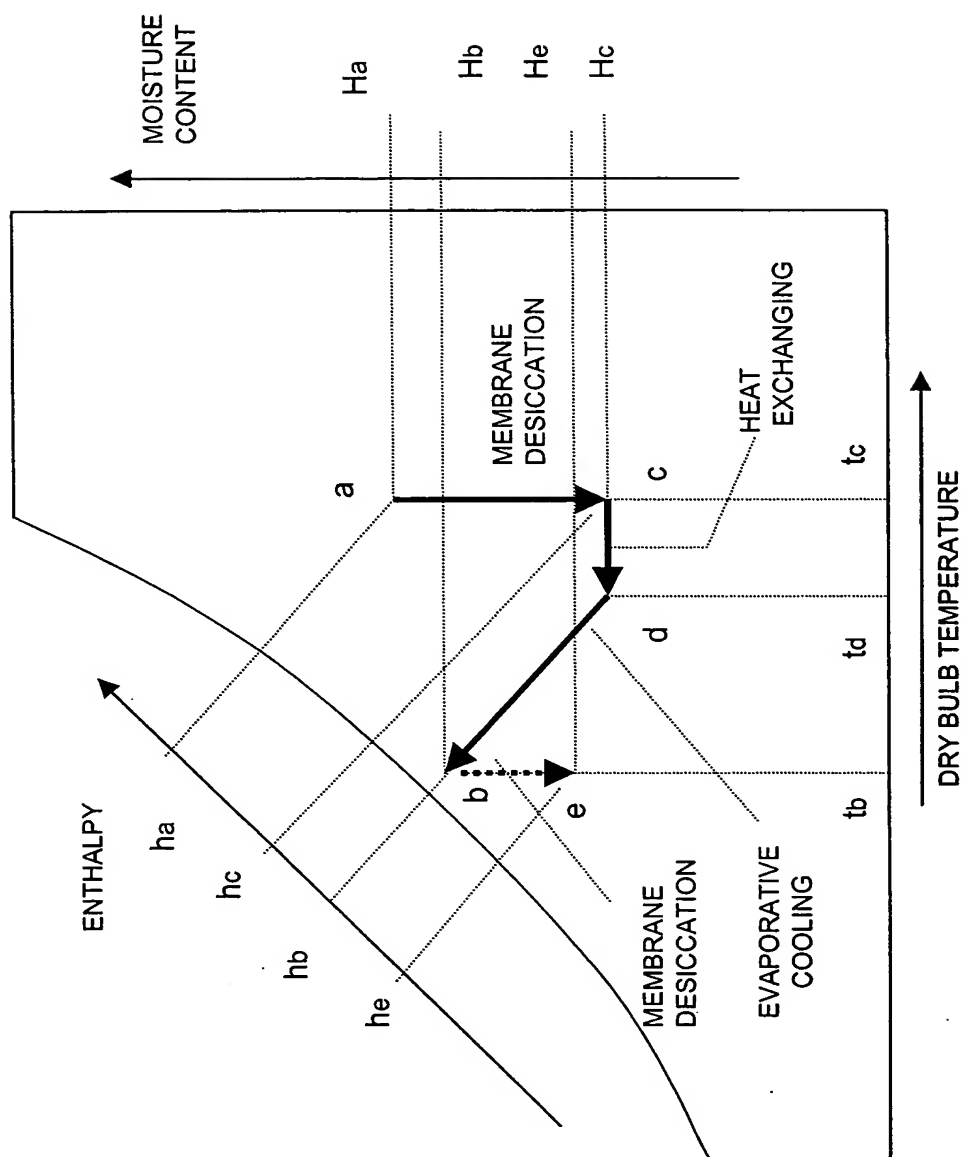


FIG. 20. CLOSED AIR CYCLE
SHOWN ON A PSYCHOMETRIC CHART

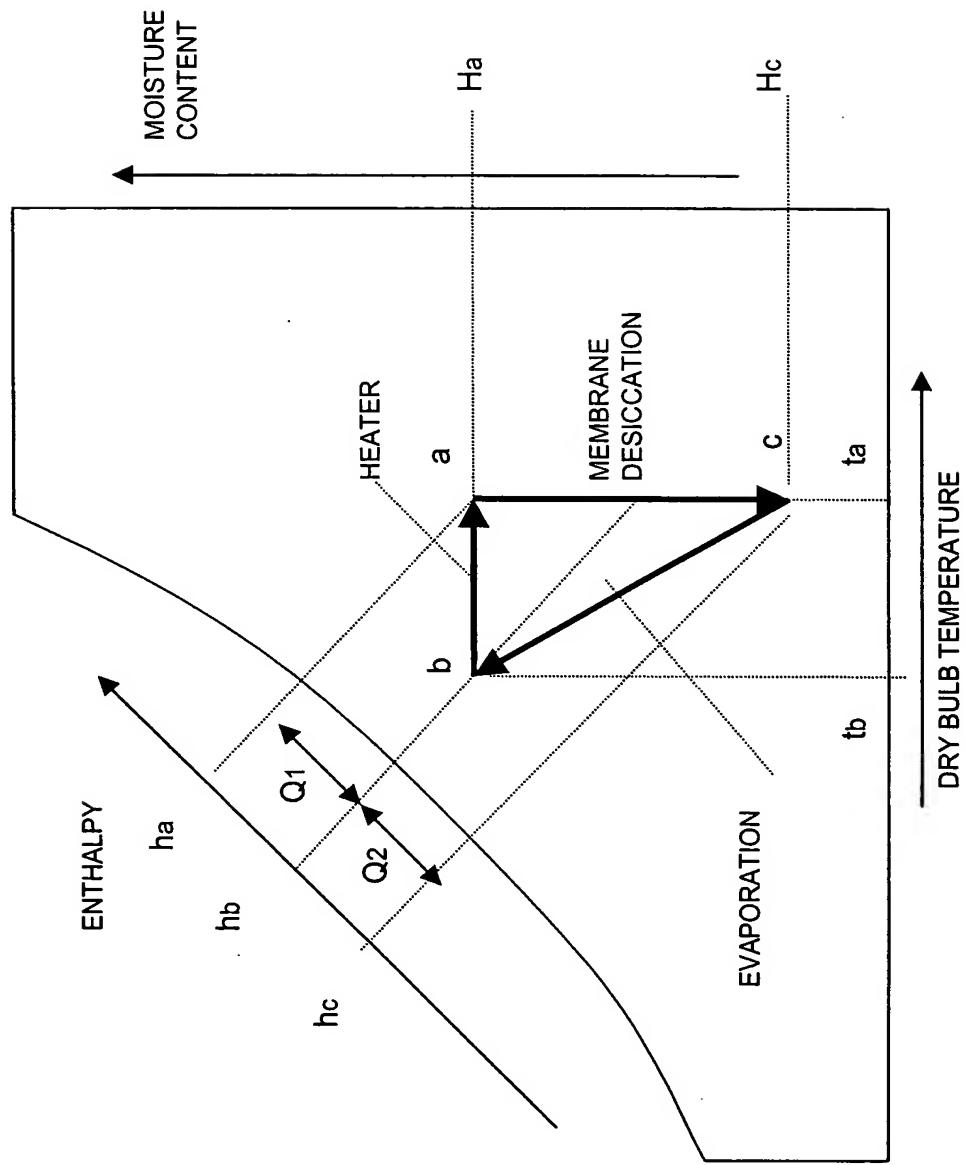


FIG. 22. OPEN CYCLE MEMBRANE HEAT PUMP PROCESS FOR WASTE HEAT RECOVERY SHOWN ON A PSYCHOMETRIC CHART

